**(152)**

# The Remaining Refractory Thickness Assessment of Hearth Part in the Blast Furnace

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In the steel industry, the blast furnace is a process for making molten iron by melting iron ore. The blast furnace body is a huge structure of 50m in height, 20m in width. It should be operated not less than 15 years during one campaign. The structural problems of this blast furnace are cracks of the steel shell and thickness reductions of the stave and the refractory of hearth part caused by wear.

Among them the thickness reduction of the hearth refractory in the blast furnace is very important factor in determining the dismantlement and the reconstruction of the blast furnace. Conventionally, the thermal model was used to estimate the residual thickness and to monitor the temperature of refractory with thermocouples installed on the refractory.
Recently, Impact Echo method is being applied to measure the residual thicknesses of concrete or nonmetallic stiff structures.

The method should be accompanied with verification in the actual blast furnace since there are differences in the reflection characteristics of the ultrasonic velocity depending on physical parameters of the steel shell, the refractory and ramming part between the steel shell and the refractory such as the size, the shape, the temperature, the consisting materials and etc.
In this study, we compared various sensors such as accelerometer, a microphone and an ultrasonic sensor and the experimental methods in determining the ultrasonic velocity of the anisotropic refractory material.

In addition, measuring refractory thickness of the actual blast furnace was carried out before dismantling and verified with exact thickness of refractory by means of measuring length of the core-boring sample and dismantling investigation.

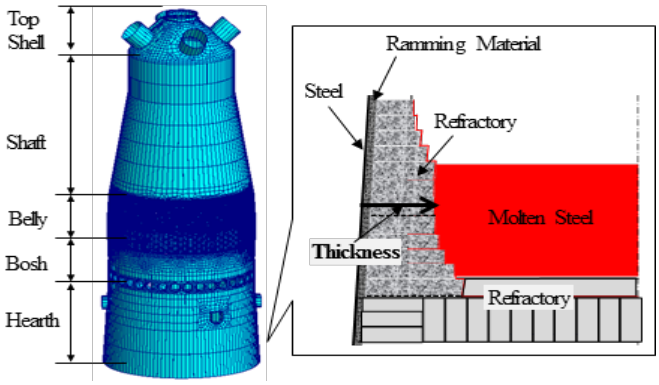


**Figure 1.** Schematic diagram of refractory thickness Assessment

**Reference:**

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